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**THE SPIDER GENUS MANGORA (ARGIOPIDAE)
IN PANAMA**

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No. 5 — *The Spider Genus Mangora (Argiopidae) in Panama*

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The two Cambridges (1889-1904) recognized a total of seven species of *Mangora* from Central America. Only one of these, *M. bimaculata* (O. P. Cambridge), was from Panama. Petrunkevitch (1925) believed that he had *M. trilineata* O. P. Cambridge from Barro Colorado Island (the Canal Zone Biological Area) and "the Wilcox camp on San Lorenzo River." As I shall indicate later, these records appear doubtful. Banks (1929) reported the collection of *M. bimaculata* (O. P. Cambridge), *M. picta* O. P. Cambridge, *M. spinula* F. P. Cambridge, and *M. trilineata* O. P. Cambridge from several localities in the Canal Zone. *M. spinula* is correctly placed but I am forced to regard the remaining three records as faulty. Chamberlin and Ivie (1936) described males and females of *M. dentembolus*, females of *M. pia*, and males of *M. belligerens* from my first collection, made in Panama during the summer of 1928. *M. dentembolus* Chamberlin and Ivie is, quite clearly, the same as *M. spinula* F. P. Cambridge. *M. pia* is the female of *M. belligerens* and, therefore, on the basis of page priority these will be known as *M. pia*. I have recognized three new species among my collections made since 1928 and a small number collected by others to whom credit is given in the appropriate places. For these new species I am proposing the following names: *M. candida* sp. nov.; *M. montana* sp. nov.; and *M. schneirlai* sp. nov. According to present knowledge, we are now able to recognize eight species, including one uncertainty, of *Mangora* in Panama. These may be listed as follows: *M. bimaculata* (O. P. Cambridge); *M. candida* sp. nov.; *M. mobilis* (O. P. Cambridge); *M. montana* sp. nov.; *M. pia* Chamberlin and Ivie; *M. schneirlai* sp. nov.; *M. spinula* F. P. Cambridge; *M. trilineata* O. P. Cambridge. Only females are known for *M. schneirlai* sp. nov. and *M. trilineata* O. P. Cambridge; both sexes are known for the remaining six species.

Acknowledgements are again gratefully extended to the following: Dr. A. S. Romer and Dr. P. J. Darlington, Jr. for their many courtesies and continued encouragement in the Museum of Comparative Zoology at Harvard College; Dr. W. J. Gertsch, American Museum of Natural History for the loan of specimens of *Mangora* from several localities in Panama; Dr. G. Owen Evans, E. Browning, and other members of

the Department of Zoology of the British Museum (Natural History) for the loan of very valuable specimens from several localities in Central America; the donors of the Penrose Fund of the American Philosophical Society and The Society of Sigma Xi for grants which enabled me to spend the summer of 1950 in the collection and study of spiders in Panama.

Genus *MANGORA* O. P. Cambridge, 1889

Key to the known species of *Mangora* in Panama

Males

1. With special ventral spines on second tibia (*bimaculata*, *candida*, *pia*, *mobilis*).....2
1. Without special ventral spines on second tibia (*montana*, *spinula*).....5
2. Fourth coxa with a conical spur and small tubercles....*M. mobilis*, p. 202
2. Fourth coxa without a conical spur and small tubercles.....3
3. Tarsal bulb with a simple, curved, hook-like clavis; the embolus is of moderate length and a regularly curved spur.....*M. bimaculata*, p. 197
3. Tarsal bulb without a simple, curved, hook-like clavis but with either a pair of tooth-like apophyses or a broad plate with a single tooth-like apophysis; embolus either long, slender, and terminally lance-like or short, obscure, and hidden.....4
4. Tarsal bulb with a robust clavis terminating in a pair of tooth-like apophyses; embolus swollen at base, then long and slender; terminating in a lance-like tip.....*M. candida*, p. 198
4. Tarsal bulb with a flat clavis terminating in a single tooth-like apophysis; embolus short, obscure, and hidden.....*M. pia*, p. 208
5. Fourth femur without a robust, ventral, basal spine....*M. montana*, p. 204
5. Fourth femur with a robust, ventral, basal spine.....*M. spinula*, p. 211

Females

1. Epigynum with a distinct, sometimes short, central tongue and a lateral lobe on each side (*bimaculata*, *candida*, *mobilis*, *schneirlai*).....2
1. Epigynum without any distinct central tongue and lateral lobes or with lateral lobes alone (*montana*, *pia*, *spinula*, *trilineata*).....5
2. Epigynum with a short central tongue and relatively long lateral convergent lobes (Fig. 1).....*M. bimaculata*, p. 197
2. Epigynum either with relatively long central tongue and short lateral lobes or with both tongue and lateral lobes short.....3
3. Epigynum with a broad plate deeply cleft in middle of anterior border (Fig. 22).....*M. schneirlai*, p. 209
3. Epigynum without a broad plate deeply cleft in middle of anterior border..4

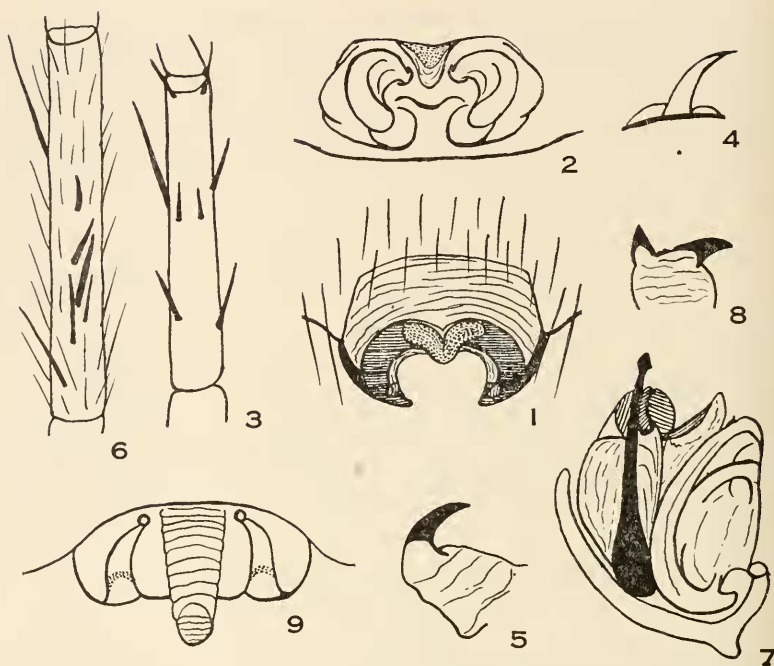
4. Epigynum with a relatively long central tongue arising from near anterior border of plate (Fig. 9).....*M. candida*, p. 198
4. Epigynum with a very short central tongue arising from posterior border of plate (Fig. 13).....*M. mobilis*, p. 202
5. Epigynum very simple; with a very short broad central lip; with a simple lateral lobe on each side (Fig. 17).....*M. montana*, p. 204
5. Epigynum more complicated; without any distinct central lip; lateral lobes, if present, much more conspicuous.....6
6. Epigynum with a deep, rounded, posterior notch; with a well defined lateral lobe on each side of notch; with two relatively large spermathecae much less than their radius apart (Fig. 27).....*M. trilineata*, p. 213
6. Epigynum without a deep rounded posterior notch; without well defined lateral lobes; spermathecae relatively smaller and farther apart.....7
7. Epigynum protruding as a massive, free extension turned ventrally at tip; deeply grooved just anterior to tip (Fig. 20).....*M. pia*, p. 208
7. Epigynum protruding as a massive, free extension but not conspicuously turned ventrally at tip; divided apically into two inconspicuous lobes separated by a shallow cleft (Fig. 25).....*M. spinula*, p. 211

MANGORA BIMACULATA (O. P. Cambridge), 1889

(Figures 1-5)

The Cambridges had this species from Veragua, Panama. Banks (1929) recorded the species from Barro Colorado Island, C. Z., but his specimens are all plainly females of *M. pia* Chamberlin and Ivie (1936). The species has not appeared in my collections and, to my knowledge, has not been collected since the originals were taken by Sarg and Boucard.

Notes taken from specimens loaned from the British Museum (Natural History): The epigynum (Figs. 1-2) has a concealing gummy mass attached to it and making it easy to confuse *M. pia* Chamberlin and Ivie with this species. The long slender branched prolateral hairs on the third tibia appear to be arranged in females in two oblique rows with seven in the first row and six in the second; in males they appear to be in two rows of three and four, respectively, although it is difficult to be certain because of the folding of the legs and the fragility of the specimen. Ventral spines on the second tibia of the male are as shown in Figure 3. The embolus of the male palp (Fig. 4) is of moderate length and like a slender spur; the clavis is a fairly robust hook (Fig. 5).



External Anatomy of *Mangora*

Figures 1-9

- Fig. 1. *Mangora bimaculata*; epigynum from below.
 Fig. 2. *M. bimaculata*; epigynum; a more posterior view.
 Fig. 3. *M. bimaculata*; ventral spines, second tibia in male.
 Fig. 4. *M. bimaculata*; embolus of male palp.
 Fig. 5. *M. bimaculata*; clavis of male palp.
 Fig. 6. *Mangora candida* sp. nov.; ventral spines, second tibia in male.
 Fig. 7. *M. candida* sp. nov.; tarsus of male palp showing embolus, etc.
 Fig. 8. *M. candida* sp. nov.; male palpal clavis.
 Fig. 9. *M. candida* sp. nov.; epigynum from below.

MANGORA CANDIDA sp. nov.

(Figures 6-9)

Male holotype. Total length 2.67 mm. Carapace 1.43 mm. long; 1.08 mm. wide opposite second coxae where it is widest; .440 mm. tall and, therefore, about .40 as tall as wide; ascends regularly from PME

to opposite interval between second and third coxae from where posterior declivity arches to posterior margin; longitudinal thoracic groove well developed.

Eyes. Eight in two rows, all dark. LE on slightly raised tubercles; AME project forward above clypeus. Viewed from above, posterior row slightly recurved, anterior row strongly recurved. Viewed from in front, anterior row slightly recurved, measured by centers. Central ocular quadrangle wider in front than behind in ratio of 3 : 2, about as long as wide in front. Ratio of eyes AME : ALE : PME : PLE = 10 : 7 : 8 : 7. LE somewhat angular, ME circular. AME separated from one another by $3/5$ of their diameter, from ALE by one half their diameter. PME separated from one another by slightly less than one fourth their diameter, from PLE by their diameter. LE separated from one another only by a line. Clypeus receding from AME. Width of clypeus equal to seven tenths of the diameter of AME.

Chelicerae. Moderately well developed; parallel; basal segment .4 mm. long. Teeth along well developed fang groove difficult to see without serious damage to holotype but probably three on each margin.

Maxillae. Parallel; well developed; quite convex; with well developed serrula along distal margin and outer distal corner.

Lip. Reaches nearly to middle of maxillae; wider than long in ratio of nearly two to one. With a pair of black terminal bristles. Sternal suture gently procurved.

Sternum. Very convex; scutiform; only slightly longer than wide; widest between second coxae but nearly as wide between first; not continued between fourth coxae which are separated by $9/11$ of the width of one of them.

Legs. 1243. Width of first patella at "knee" .198 mm., tibial index of first leg 8. Width of fourth patella at "knee" .190 mm., tibial index of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.690	.520	1.820	1.820	.715	6.565
2.	1.462	.455	1.235	1.365	.700	5.217
3.	.975	.227	.585	.650	.455	2.892
4.	1.495	.400	1.170	1.170	.585	4.820
Palp	.286	.115	.110	—	.550	1.061

Spines. First leg: femur dorsal 1-1-1-1-0, prolateral 0-0-1-1-0, retrolateral 0-0-0-1-1-0, ventral 0; patella dorsal 1(weak)-1, retrolateral 0-1-0; tibia dorsal 0-1-1-1-0, prolateral 0-1-1-0, retrolateral

0-0-1-1, ventral 0-2-0-2 (right) and 0-2-1r-0-2(left); metatarsus dorsal 0, prolateral 0-1-0-0, retrolateral 0-1-0-0-0, ventral 0. Second leg: femur only dorsal 1(weak)-1-1-0, retrolateral 0-0-0-1-1-0; patella essentially as in first; tibia dorsal 0-1-1-1-0, prolateral and retrolateral 0-0-1-0, ventral as in Figure 6; metatarsus only prolateral 0-1-0-0-0 and retrolateral 0-1-0-0. Third leg: femur only dorsal 0-1-1-1-0 and retrolateral 1 near distal end; patella essentially as in first; tibia dorsal 1-0-1-0, prolateral 0, retrolateral 1-0-1, ventral 0-1r-2; metatarsus dorsal 0-1-0-1(weak), prolateral 0-1-0-1, retrolateral 0-1-0-1(weak), ventral and median 1-1-1. Fourth leg: femur dorsal 0-1-1-1-0, prolateral and retrolateral 1 near distal end, ventral 1-0-1; patella essentially as in first; tibia dorsal 0-1-1-0, prolateral 0-0-1-0, retrolateral 0-1-1-0, ventral 0-1p-0-2; metatarsus dorsal 1-1-0, prolateral 0-1-1-1, retrolateral 0-1-0-0, ventral 0. The long, slender, branched hairs on the prolateral side of the third tibia appear to be seven in number and somewhat irregularly arranged. The first coxa has a well developed ventral distal hook or spur and the second femur has a moderately well developed prolateral proximal groove and chitinized ridge. Three claws throughout as usual in the genus.

Palp. Patella with a single long distal spine; both patella and tibia short, the latter with a ventro-lateral extension. The embolus arises dorsally from near the base of the bulb where it is somewhat enlarged, and then extends in a gentle curve beyond the distal end of the bulb where it terminates in a lance-like tip (Figs. 7-8). The clavis is short, robust, and bifurcate; this term is continued from F. P. Cambridge.

Abdomen. Ovoid; moderately well supplied dorsally and laterally with recurved bristles tending to become longer and more spine-like toward the base; with a well developed colulus. Other features as usual in the genus.

Color in alcohol. Legs, mouth parts, and cephalothorax a fairly uniform yellowish color. Abdomen: nearly white; the posterior two-fifths of the dorsum bears a series of four pairs of elongate transverse black spots, the first three pairs more or less oval, the last pair hardly more than a line; in between the larger spots are rows of small and somewhat irregularly arranged black dots.

Female allotype. Total length 3.445 mm. Carapace 1.365 mm. long; 1.170 mm. wide opposite interval between second and third coxae; .715 mm. tall opposite third coxae where it is tallest and, therefore, about .61 as tall as wide; quite gibbous at greatest height.

Eyes. Central ocular quadrangle wider in front than behind in ratio of about 5 : 4; longer than wide in front in ratio of 12 : 11. Ratio of eyes AME : ALE : PME : PLE = 9 : 7.5 : 8 : 7. AME separated from one another by two-thirds of their diameter, from ALE by their radius. PME separated from one another by one-half of their radius, from PLE by slightly more than their diameter. LE separated only by a line. Otherwise essentially as in male.

Chelicerae. With three teeth along promargin of fang groove, the outermost one very minute; two fairly robust teeth along retromargin. Otherwise essentially as recorded for the male.

Maxillae, Lip, and Sternum. Essentially as recorded for the male.

Legs. 1243. Width of first patella at "knee" .2166 mm., tibial index of first leg 11. Width of fourth patella at "knee" .2058 mm., tibial index of fourth leg 13.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.690	.585	1.430	1.182	.780	6.305
2.	1.495	.585	1.170	1.365	.690	5.305
3.	.975	.396	.638	.704	.440	3.153
4.	1.560	.528	1.100	1.300	.550	5.038

Spines. First leg: femur dorsal 1-1-1-1, prolateral 0-0-1-1-0, retrolateral only one near distal end; patella essentially as in male; tibia dorsal 0-1-1-1-0, prolateral 0-1-1-0, retrolateral 0-1d-0-1-0, ventral 0-2-1p-1p; metatarsus dorsal 1-0-0, prolateral and retrolateral 0-1-0-0, ventral 1r-0-0. Second leg: femur dorsal as in first, prolateral apparently only one near distal end, retrolateral 0-0-0-1-1-0, ventral 0; patella as in male; tibia dorsal as in male, prolateral and retrolateral as in male, ventral 0-2-1p; metatarsus dorsal 1-0-0, prolateral 1-0-0, retrolateral 0-1-0-0, ventral 0-1r-0-0-0. Third leg: femur only dorsal 0-0-1-1-1; patella essentially as in first and second; tibia dorsal 0-1-0-1-0, prolateral 0, retrolateral 0-0-1, ventral 0-0-2; metatarsus dorsal 0-1-0-0, prolateral 0-0-1, retrolateral 0, ventral median 0-1-1-1. Fourth leg: femur dorsal 0-1-1-1, prolateral and retrolateral 1 near distal end, ventral 0; patella as in other legs; tibia dorsal 1-0-0, prolateral 0-0-1-0, retrolateral 0-1-1, ventral 0-1p-2; metatarsus dorsal 0-1-0, prolateral 0-1-0-1, ventral and median 0-0-1-1. The long branched prolateral hairs on third tibia apparently arranged in two irregular rows of three each. Tarsal claws as usual in the genus. Palpal claw with three long slender teeth.

Abdomen. Essentially as in male except for sexual features.

Epigynum. Rather distinctive; nearly twice as wide as long, including the scape; the scape is long, transversely rugulose, turned ventrally at tip and originates near the anterior border of the epigynal plate (Fig. 9).

Color in alcohol. Similar to that of male. The series of black dorsal spots on posterior half of abdomen more fully developed than in male; these may be considered to occur in five instead of four pairs with the intermediate rows of black dots more pronounced than in male with the latter tending to join in narrow bands.

Type locality. Male holotype from Barro Colorado Island, Panama Canal Zone, June, 1950; female allotype from Canal Zone Forest Reserve, C. Z.; male and female paratypes from Madden Dam forest and Canal Zone Forest Reserve, C. Z., August, 1939; Canal Zone Forest Reserve, C. Z., July, 1950.

MANGORA MOBILIS (O. P. Cambridge), 1889

(Figures 10-14)

Epeira mobilis O. P. Cambridge, 1889

E. mobilis Keyserling, 1903

M. mobilis F. P. Cambridge, 1904

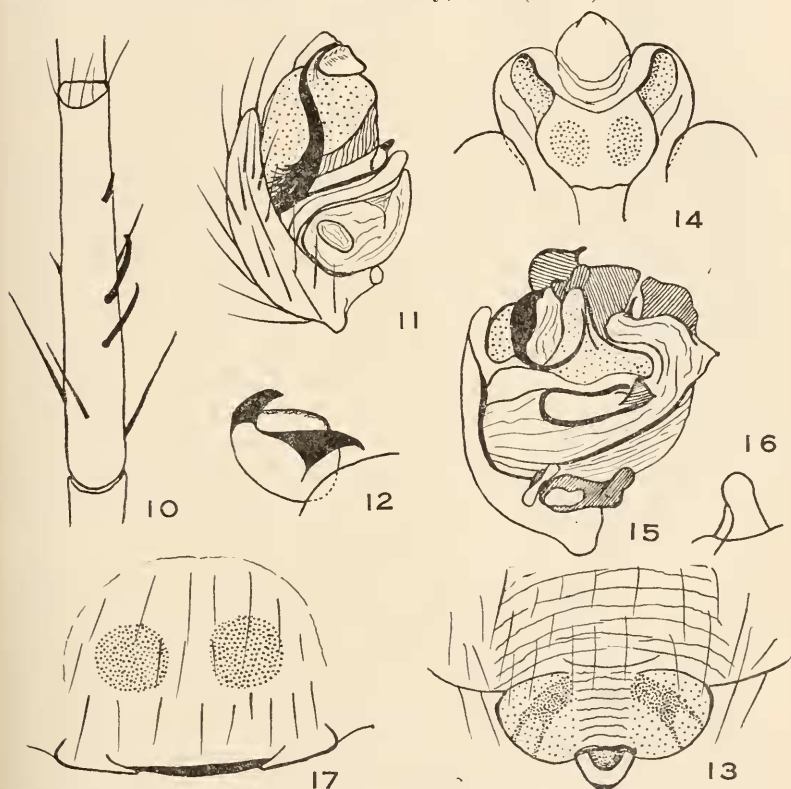
M. mobilis Petrunkevitch, 1911

Male. The special ventral spines on the second tibia appear as shown in Figure 10 although some variation has been noted. The fourth femur has a fairly robust ventral proximal spine much as in *M. spinula*. The fourth coxa has a prominent ventral spur together with two or three small tubercles. The usual ventral distal spur is present on the first coxa together with the usual prolateral proximal chitinous ridge and groove on the second femur. The male palp has a long sinuous embolus and a clavis terminating in two sharply pointed prongs (Figs. 11-12).

Female. The epigynum is nearly twice as broad as long; it has a short tongue arising from near the posterior margin (Figs. 13-14); there is a transversely rugulose median region with a somewhat convex lobe on each side.

The Cambridges had this species from Mexico and Guatemala. I now have it from the following localities in Panama: Barro Colorado Island,

C. Z., August, 1950; Madden Dam region, C. Z., August, 1939 and July, 1950 when it appeared to be abundant; Chilibre, C. Z., July, 1950; Summit, C. Z., July-August, 1950 when it also appeared to be abundant; El Cermeno, R. P., February, 1940 (Zetek).



External Anatomy of *Mangora*

Figures 10-17

- Fig. 10. *Mangora mobilis*; ventral spines, second tibia in male.
 Fig. 11. *M. mobilis*; tarsus of male palp to show embolus, etc.
 Fig. 12. *M. mobilis*; male palpal clavis.
 Fig. 13. *M. mobilis*; epigynum from below.
 Fig. 14. *M. mobilis*; epigynum dissected and shown from dorsal surface.
 Fig. 15. *Mangora montana* sp. nov.; left male palp to show embolus, clavis, etc.
 Fig. 16. *M. montana* sp. nov.; full posterior view of palpal clavis.
 Fig. 17. *M. montana* sp. nov.; epigynum from below.

MANGORA MONTANA sp. nov.

(Figures 15-17)

Male holotype. Total length 2.60 mm. Carapace 1.365 mm. long; 1.203 mm. wide opposite interval between second and third coxae where it is widest; .618 mm. tall and, therefore, about .51 as tall as wide; regularly arched from greatest height opposite third coxae to posterior border; with a scant covering of short procurved hair and a slender spinule behind each PLE.

Eyes. Eight in two rows, all dark; LE on slightly raised tubercles; AME protrude prominently over clypeus; viewed from above, posterior row gently recurved, anterior row strongly recurved; viewed from in front, anterior row slightly procurved, measured by centers; central ocular quadrangle wider behind than in front in ratio of about 5 : 4, slightly longer than wide behind. Ratio of eyes AME : ALE : PME : PLE = 7.5 : 5.5 : 10.5 : 6. AME separated from one another and from ALE by five-sixths of their diameter. PME separated from one another by about two-thirds of their diameter, from PLE by four-fifths of their diameter. Laterals separated from one another only by a line. Width of clypeus equal to slightly more than the diameter of AME. Clypeus with a weak spinule below interval between AME and a row of four spinules near ventral border, the outer well developed, the inner two very weak, all turned toward middle line.

Chelicerae. General features as usual in the genus. Teeth along fang groove difficult to see without serious damage to holotype but a paratype has three along promargin and two along retromargin.

Maxillae. Parallel or slightly convergent; with well developed and extensive serrula along distal margin and outer distal corner.

Lip. Deeply grooved at base; wider than long in ratio of 2 : 1; reaches little more than one-third of length of maxillae. Sternal suture procurved.

Sternum. Scutiform; strongly convex; depressed in the middle of anterior end; only slightly longer than wide opposite second coxae where it is widest; apparently continuous between fourth coxae which are separated by nearly four-fifths of their width; with numerous stiff dark bristles.

Legs. 1423. Width of first patella at "knee" .1949 mm., tibial index of first leg 12. Width of fourth patella at "knee" .1733 mm., tibial index of fourth leg 12.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.430	.455	1.170	1.398	.748	5.201
2.	1.365	.455	1.040	1.250	.683	4.793
3.	.910	.325	.618	.683	.500	3.036
4.	1.430	.390	1.105	1.200	.683	4.808
Palp	.325	.128	.076	—	.650	1.179

Spines. First leg: femur dorsal 0-1-1-1-0, prolateral 0-0-1-0, retrolateral 0-0-1-1-0, ventral 0; patella only dorsal 1-1 and retrolateral 0-1-0; tibia dorsal 0-1-1-1-0, prolateral 0-1-1-0, retrolateral 0-0-1-1, ventral 0-2-1p-2; metatarsus dorsal 1-0-0, prolateral 1-0-0, retrolateral 0-1-0-0, ventral 0. Second leg: femur dorsal and retrolateral as in first, prolateral and ventral 0; patella as in first; tibia dorsal essentially as in first, prolateral 0-1-0-1-0, retrolateral 0-1-1(weak), ventral 0 (note absence of special spines such as occur on the second tibia of *M. candida* sp. nov.); metatarsus dorsal 1-0-0, prolateral 1-0-0, retrolateral 0-1-0-0, ventral 0-2-0-0. Third leg: femur only dorsal 0-1-1-1 and retrolateral 1 near distal end; patella essentially as in first; tibia dorsal 1r-0-1-0, prolateral and retrolateral 0, ventral 0-0-1r-1r; metatarsus dorsal 1-0-0, prolateral 0-1-0-1, retrolateral 0-1-0, ventral and median 1-0-1. Fourth leg: femur and patella as in third; tibia dorsal 1r-1-1-0, prolateral 0-1-0, retrolateral 0-0-1-1(weak), ventral 0; metatarsus dorsal 1-1r-0-0, prolateral 0-1-0-0-1, retrolateral 0, ventral and median 1-0-0. The long, slender, branched, prolateral hairs on the third tibiae are arranged in two oblique rows of three and five, respectively. There are also two ordinary trichobothria lying dorsal to the row of three branched hairs. The usual distal coxal spur is moderately well developed on the first coxa and the short prolateral proximal groove and chitinized ridge are also present on the second femur. Tarsal claws appear to be as usual in the genus.

Palp. Complicated; both patella and tibia very short, especially the latter; the tibia is transversely extended and trilobed, nearly three times as wide as long; patella with the usual long, slender, distal spine. The embolus is near the distal end of the bulb and is curved nearly into a circle. The clavis is a simple, thin, and somewhat triangular structure viewed as in Figure 15 but is a short, rounded plate as seen when viewed as in Figure 16. At the distal end of the bulb there is a massive, deeply grooved process as well as several other apophyses (Figs. 15-16).

Abdomen. Ovoid; longer than wide in ratio of 5 : 3; with a prominent colulus. Other features as usual in the genus.

Color in alcohol. All eyes on black spots. Cephalothorax, mouth parts, and legs various shades of light reddish brown. Abdomen: dorsally with a few scattered silvery subchitinous granules; posterior half of dorsum with an obscure folium; anterior half of dorsum yellowish with central dusty flecks outlining an obscure median stripe; lateral sides dusty brown; venter yellowish with an obscure central dusty brown stripe.

Female allotype. Total length 3.705 mm. Carapace 1.495 mm. long; 1.170 mm. wide opposite third coxae where it is widest; .715 mm. tall opposite interval between second and third coxae where it is tallest and, therefore, about .61 as tall as wide; somewhat more gibbous than in male. Otherwise essentially as in male.

Eyes. Ratio of eyes AME : ALE : PME : PLE = 8 : 7 : 10 : 7.5. AME separated from one another by nearly their diameter, from ALE by seven-eighths of their diameter. PME separated from one another seven-tenths of their diameter, from PLE by the same distance. Width of clypeus equal to five-fourths of the diameter of AME. Other features essentially as in male.

Chelicerae. Somewhat difficult to determine the teeth along the fang groove but apparently three along promargin and two along retromargin.

Maxillae and Lip. Essentially as in male.

Sternum. Essentially as in male except that posterior end is definitely not continued between fourth coxae.

Legs. 1243. Width of first patella at "knee" .2166 mm., tibial index of first leg 12. Width of fourth patella at "knee" .2166 mm., tibial index of fourth leg 14.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.625	.585	1.200	1.495	.748	5.653
2.	1.495	.585	1.170	1.300	.715	5.265
3.	.960	.374	.660	.682	.520	3.196
4.	1.625	.455	1.105	1.300	.650	5.135

Spines. First leg: femur dorsal 0-1-1-1-1 on right, 0-1-1-1-1 on left, prolateral 0-0-1-0, retrolateral 1 near distal end, ventral 0; patella as in male; tibia dorsal 1-1-1-0, prolateral 0-1-1-1(weak), retrolateral 0-0-1-1(weak), ventral 0-2-0-0; metatarsus dorsal and median ?1-0-0, prolateral 1-0-0, retrolateral 0-1-0-0, ventral 2-0-0.

Second leg: femur only dorsal as in first and retrolateral 0-0-1-1-0; patella as in first; tibia dorsal as in first, prolateral and retrolateral 0-0-1-0, ventral 0-2-0-0; metatarsus dorsal and prolateral 1-0-0, retrolateral 0-1-0-0, ventral 1r-0-0. Third leg: femur only dorsal 0-0-1-1-1; patella apparently only dorsal 1-1; tibia dorsal 1-0-0, prolateral 0-1-1(weak), retrolateral 0-0-1, ventral 0-1r-1r; metatarsus dorsal 1-0-0, prolateral 0-1-0-1, retrolateral 0-1-0-0, ventral and median 1-1-1. Fourth leg: femur dorsal 0-0-1-1-1, prolateral and retrolateral 1 near distal end, ventral 1r near distal end; patella as in first; tibia dorsal 1-1-1-0, prolateral 0-1-1(weak), retrolateral 0-0-1-1(weak), ventral 0-1p-0-0; metatarsus dorsal 1-0-0, prolateral 0-1-0-1, retrolateral 0-1-0-0, ventral and median 1-0-1(weak). Special branched prolateral proximal hairs on third tibia arranged in two oblique rows of four and five, respectively. Palpal claw pectinate in a single row of several fine teeth. Palp with numerous stiff spines.

Abdomen. Overlaps carapace fully one-third of length of the latter. Except for sexual features, essentially as in male.

Epigynum. Simple; with two conspicuous spermathecae less than a diameter of one of them apart but apparently the distance varies somewhat in different individuals; with a posterior chitinized lip having a secondary lip in the center (Fig. 17).

Color in alcohol. Legs darker than in male and with color of segments more variable. Carapace with a median black stripe and another lateral black stripe on each side. Sternum dark gray. Abdomen: with a narrow central basal black mark connected to a broad central brownish variegated stripe extending through four-fifths of the dorsum; on each side of this central stripe there is a whitish stripe with silvery dots, narrowed at posterior end; each lateral side has a dark, nearly black stripe, narrow in front but widened behind; below this dark lateral stripe there is a narrow whitish stripe also with silvery dots; the venter has a central dark stripe with a narrower light stripe on each side; there is also a narrow dark ventrolateral stripe on each side. There are, therefore, five stripes on each side between the central dorsal and the central ventral stripes. This rather striking color pattern is highly variable among the paratypes and cannot be a reliable guide to the determination of species.

Type locality. Male holotype and female allotype from El Volcan, R. P., August, 1950. Several male paratypes from the same locality, February-March, 1936 (W. J. Gertsch). Female paratypes from the

following localities in Panama: Boquete, July, 1939; El Volcan, February-March, 1936 (W. J. Gertsch) and August, 1950; Cerro Punta, March, 1936 (W. J. Gertsch).

MANGORA PIA Chamberlin and Ivie, 1936
(Figures 18-21)

Mangora bimaculata Banks, 1929

M. belligerens Chamberlin and Ivie, 1936 (males)

Some of the males and females collected by Banks on Barro Colorado Island and identified as *M. bimaculata* (O. P. Cambridge) quite clearly belong here. And it now seems certain that the females described by Chamberlin and Ivie go with the males described as *M. belligerens*. Hence, on the basis of page priority I am uniting them under the name *M. pia*. This is a relatively large species with females five to six millimeters long and males four to five millimeters long.

Males. The special ventral spines on the second tibia are shown in Figure 18. The fourth femur has a robust ventral proximal spine resembling that of *M. spinula*; a much weaker ventral proximal spine appears to be normal to each of the other femora. The usual distal spur is present on the first coxa together with the usual chitinized ridge and groove on the second femur. The long slender branched hairs on the third tibia appear to be arranged in two oblique rows of six each. Male palp: there is a small maxillary chitinized tooth just dorsal to the serrula which appears to work in opposition to a chitinized ridge near the base of the palpal femur; the tarsus is large and provided with several apophyses; the embolus appears to be small, obscure and more or less hidden; the patella has the usual long single distal spine; the clavis terminates in a relatively small plate with a single sharply pointed tooth (Fig. 19).

Female. The long slender branched hairs on the third tibia appear to be arranged in two oblique rows of seven each. Four promarginal teeth and three retromarginal show clearly along the fang groove; the groove itself has several minute denticles. Epigynum: extended free of the abdomen as a strongly chitinized body turned ventrally at the tip; deeply grooved at the point where it turns (Figs. 20-21).

Chamberlin and Ivie had this species only from Barro Colorado Island, C. Z. Records of the species now exist as follows: Barro Colorado Island, April-August, 1924, 1928, 1934, 1936, 1939, 1946 (Schneirla), and 1950; Madden Dam region, August, 1939; Canal Zone

Forest Reserve, August 1939 and July, 1950; France Field, C. Z., August, 1939; Summit, C. Z., November, 1946 (Krauss); Cocoli, C. Z., Sept., 1946 (Krauss); Taboga Island, R. P., August, 1946; Pedro Miguel, and Chilibre, C. Z., July, 1950.

MANGORA SCHNEIRLAI sp. nov.

(Figure 22)

Female holotype. Total length 4.875 mm. Carapace 2.015 mm. long; widest opposite third coxae where it is 1.495 mm. wide; very gibbous opposite interval between second and third coxae where it is .975 mm. tall and, therefore, about .65 as tall as wide; rises steeply from PME to apex of gibbosity and then descends steeply to posterior margin; with well developed longitudinal thoracic groove.

Eyes. Eight in two rows, all dark; LE on slightly raised tubercles; AME protrude over clypeus to a moderate degree; viewed from above, posterior row gently recurved, anterior row strongly recurved; viewed from in front, anterior row gently recurved, measured by centers. Central ocular quadrangle wider in front than behind in ratio of 27 : 22, only slightly longer than wide in front. Ratio of eyes AME : ALE : PME : PLE = 10.5 : 7.5 : 9.5 : 8. AME separated from one another by slightly less than their diameter, from ALE by nine-tenths of their diameter. PME separated from one another by slightly more than their radius, from PLE by nearly 1.4 times their diameter. Laterals barely separated. Width of clypeus about seven-tenths of the diameter of AME. Clypeus with a row of five spinules, the outermost in the row the most robust.

Chelicerae. Robust; basal segment .704 mm. long; vertical and parallel; with a rather poorly developed basal boss; fang well developed and evenly curved; fang groove with four promarginal teeth and three retromarginal teeth.

Maxillae. Parallel; robust; quite convex on retromarginal surface; with extensive serrula along distal border and outer distal corner; also with extensive scopulae along inner surfaces and inner distal corners.

Lip. Wider than long in ratio of about 4 : 3; reaches to less than the middle of maxillae. Sternal suture moderately procurved.

Sternum. Scutiform; slightly wider than long; widest at interval between second and third coxae; moderately convex; not extended between fourth coxae which are separated by nearly one third of their width.

Legs. 1423. Width of first patella at "knee" .330 mm., tibial index of first leg 14. Width of fourth patella at "knee" .308 mm., tibial index of fourth leg 15.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	1.950	.700	1.593	1.755	.813	6.811
2.	1.875	.655	1.495	1.625	.813	6.463
3.	1.235	.455	.943	.902	.550	4.085
4.	2.030	.650	1.430	1.658	.845	6.663

Spines. Numerous irregularities in spination have been noted but are not recorded; right and left limbs often show marked differences on corresponding surfaces. First leg: femur only dorsal right 1-1-1-1, left 1-1-1-1, prolateral right 0-0-1-1-1-0, left 0-0-1-1-0, retrolateral only one near distal end; patella only dorsal 1-1, retrolateral 0-1-1-0; tibia dorsal 1-1-1-0, prolateral 0-1-1-1(weak), retrolateral 0-0-1-1, ventral 0-2-1p-2; metatarsus dorsal 0-1-0-0, prolateral 0-1-1-0, retrolateral 0-1-0, ventral 0-2-0-0. Second leg: femur dorsal right 0-1-1-0-1, left 1-0-1-1-0, prolateral and retrolateral only one near distal end; patella as in first; tibia dorsal 1-1-1-0, prolateral 0-1-1-1, retrolateral 0-1-1, ventral 0-1r-1p-2; metatarsus dorsal and prolateral 1-0-0, retrolateral 0-1-0-0, ventral 2-1p-1r-1p on right and 0-2-0-0 on left. Third leg: femur only dorsal 0-1-1-1, prolateral and retrolateral only one near distal end; patella as in first; tibia dorsal 1-1-1(weak), prolateral and retrolateral only one near distal end, ventral 0-1p-2; metatarsus dorsal 0-1-0-0, prolateral 1-1-1, retrolateral 0-1-0-0, ventral 2-1r-0-1r. Fourth leg: femur dorsal 0-1-1-1, prolateral and retrolateral only one near distal end, ventral 1r near distal end; patella dorsal 1-1, prolateral and retrolateral 0-1-0; tibia dorsal 1-0-1-1-0, prolateral 0-1-1-0-1, retrolateral 0-0-1-1, ventral 0-1r-1r-2; metatarsus dorsal and prolateral 0-1-0-0, retrolateral 0-1-1-1-1, ventral 0. The long branched prolateral proximal hairs on the third tibia appear to be arranged in two rows of five and six, respectively. Tarsal claws as usual in the genus. Palpal claw pectinate in a single row of numerous slender teeth.

Abdomen. 3.575 mm. long; 1.755 mm. wide; ovoid; other features as usual in the genus.

Epigynum. With a conspicuous, strongly chitinized plate divided anteriorly into a pair of lobes separated by a deep central cleft; a short broad median scape extends posteriorly and is flanked by a distinct notch on each side (Fig. 22).

Color in alcohol. Legs, mouth parts, and cephalothorax variable shades of yellowish and light reddish brown. Abdomen: with a series of four pairs of whitish spots extending along the middle of the dorsum and diminishing in size posteriorly; another series of four whitish spots on each lateral side; each of the white spots is made by a cluster of subchitinous granules; the posterior half of the dorsum also bears a series of three pairs of nearly black spots increasing in size posteriorly; the venter is yellowish with a pair of white dots anterior to the bases of the first pair of spinnerets.

Type locality. Female holotype from Barro Colorado Island, C. Z., April, 1946. One mature female paratype and probably three immature females from the same locality, April-May, 1946. All of these were collected by Dr. T. C. Schneirla, American Museum of Natural History, for whom the species is named, and kindly loaned for this study by Dr. Willis J. Gertsch, American Museum of Natural History.

MANGORA SPINULA F. P. Cambridge, 1904

(Figures 23-26)

M. picta O. P. Cambridge, 1889 (females only)

M. picta F. P. Cambridge, 1904 (females only)

M. spinula F. P. Cambridge, 1904 (males only)

M. picta Petrunkevitch, 1911 (females only)

M. spinula Petrunkevitch, 1911

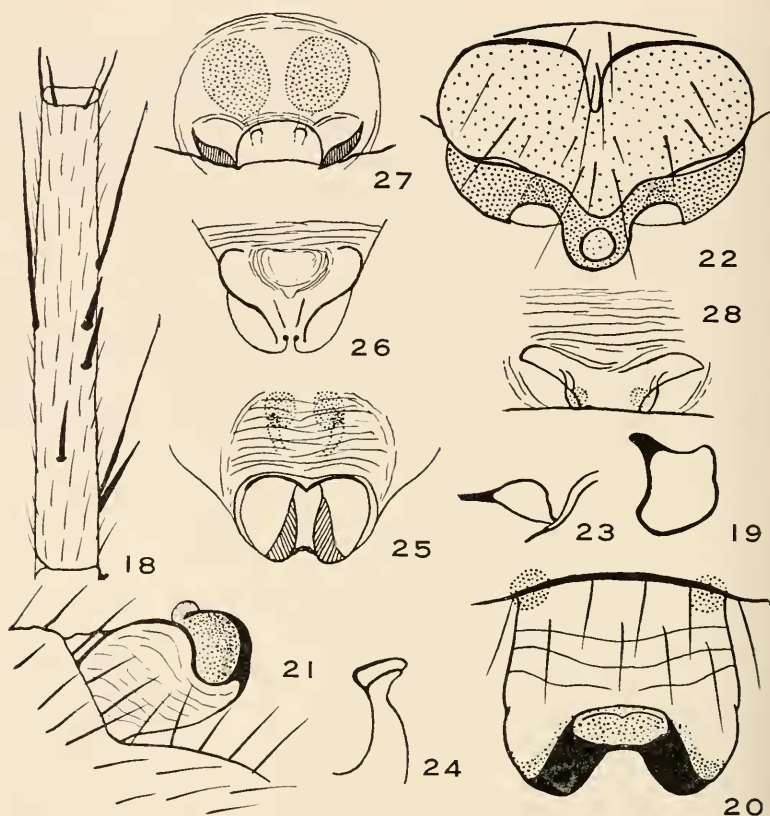
M. picta Banks, 1929

M. spinula Banks, 1929

M. trilineata Banks, 1929

M. dentembolus Chamberlin and Ivie, 1936

F. P. Cambridge found that the specimens regarded by the elder Cambridge as belonging to *M. picta* O. P. Cambridge were a mixture of several species but he retained females which he thought properly paired with the males. On the basis of my study of many specimens from Panama together with some on loan from the British Museum I have been forced to believe that the females of *M. picta* as recognized by both Cambridges are in reality the females of *M. spinula* which were not recognized by the author of the latter species. Chamberlin and Ivie had males and females properly paired but *M. dentembolus* is quite clearly the same as *M. spinula* F. P. Cambridge. Banks (1929) properly placed some of the males collected on Barro Colorado Island and nearby localities. Some of the females were, quite naturally,

External Anatomy of *Mangora*

Figures 18-28

- Fig. 18. *Mangora pia*; ventral spines, second tibia in male.
 Fig. 19. *M. pia*; male palpal clavis.
 Fig. 20. *M. pia*; epigynum from below.
 Fig. 21. *M. pia*; epigynum in profile.
 Fig. 22. *Mangora schneirlai* sp. nov.; epigynum from below.
 Fig. 23. *Mangora spinula*; male palpal clavis to show shape from a different view than that usually shown.
 Fig. 24. *M. spinula*, apophysis partly enclosed by curled embolus.
 Fig. 25. *M. spinula*; epigynum as ordinarily seen in ventral view.
 Fig. 26. *M. spinula*; epigynum; a more anterior view to show median depression.
 Fig. 27. *Mangora trilineata*; epigynum from a ventral view.
 Fig. 28. *M. trilineata*; epigynum; a more posterior view.

assigned to *M. picta* O. P. Cambridge; others he placed in *M. trilineata* O. P. Cambridge; he also assigned a few males to *M. trilineata*. The species seems to be widely distributed at least from Mexico to Panama and appears to be the most numerous of any of the species known from Panama.

Males. Many of the males are only two millimeters in length and some are even shorter than this. There are no special ventral spines on the second tibia. The fourth femur has a stout basal ventral spine which F. P. Cambridge considered the exclusive possession of males of this species among those from Central America. This is now known to occur on males of several species. The usual distal ventral spur on the first coxa is present and the usual prolateral proximal chitinized ridge and groove are also present on the second femur but they are small. Male palp: the apophysis, termed the conductor by F. P. Cambridge, is a long flat terminal hook; the clavis is also quite conspicuous proximal to the terminal curve in the embolus and is seen to be much broadened in the middle when properly viewed; the embolus originates near the distal end of the bulb, arches ventrally and then turns distally at the tip; there is also another characteristic process (Fig. 24) lying between the tip of the embolus and the median part of this structure.

Females. The fang groove appears to have four teeth along the promargin, the first and third relatively large, the second and fourth small; the retromargin seems to have only two relatively large teeth. Epigynum: extends for some distance free of the abdomen but it is not so strongly chitinized as in *M. pia*. Distally the extended part is divided by a groove into two lobes. Just anterior to the two lobes there is a relatively large depression (Figs. 25-26).

Hundreds of specimens are now in my collection from the following localities and extending over the period from 1924 to 1950: many separate localities in the Panama Canal Zone; Arraijan, El Valle, Boquete, El Cermeno, Porto Bello, El Volcan, and Cocoli outside of the Canal Zone in the Republic of Panama.

MANGORA TRILINEATA O. P. Cambridge, 1889

(Figures 27-28)

M. trilineata F. P. Cambridge, 1904

M. trilineata Petrunkevitch, 1911

M. trilineata Petrunkevitch, 1925

The Cambridges had only females from Mexico and Guatemala. Banks (1929) mistakenly reported this species from the Canal Zone as indicated under *M. spinula*. This is also true of the specimen from Costa Rica reported by Banks (1909). Petrunkevitch (1925) reported a female from Barro Colorado Island and two others from "the Wilcox camp on San Lorenzo River." I have had no opportunity to examine these specimens but on the basis of my experience with several hundred individual Mangoras from Panama I am obliged to regard this record as very questionable.¹ The species has not appeared in my collections and I am of the opinion that it has not been taken since the original collections upon which the work of the Cambridges was based. Because of the uncertainty of correct identification I am retaining the species among those known to occur in Panama and including it in the key to accompany this paper.

The long slender branched prolateral hairs on the third tibia appear to be arranged in two oblique rows with five in the first and four in the second row. The epigynum is quite characteristic; it has a central semicircular notch in the posterior margin and lacks a tongue; two large, somewhat oval spermathecae are separated by less than one half of the short radius of one of them (Figs. 27-28).

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¹ Through the courtesy of Dr. Petrunkevitch I have recently had the opportunity to examine the specimens from the Wilcox camp. In my judgment, both specimens belong to the species *M. spinula* F. P. Cambridge. The single female from Barro Colorado Island reported as *M. trilineata* O. P. Cambridge remains unavailable.

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